Breastfeeding as a biological dialogue

When we were writing up the first article in the 2016 Lancet Breastfeeding Series, my colleague Simon Murch (a British pediatrician) came up with a remarkable sentence: “breast milk is the ultimate personalized medicine”. Since then, I have been referring to the mother-infant interaction during breastfeeding as a “biological dialogue”, in which the child passes information to the mother about its needs, and the mother responds by altering the quantity and composition of her milk. Multiple mechanisms are involved in this exchange of information, and we are still scratching the surface of the biology of lactation. The article by Pannaraj and colleagues, in JAMA Pediatrics, fills a gap in the literature by quantifying how bacteria present in breast milk and in areolar skin contribute to the development of the infant’s microbiota, and how the latter is specific to the microbial communities in the infant’s mother, when compared to other nursing women.

For quite some time, we have known about the anti-infective properties of breast milk—lactoferrin, lysozymes, antibodies, oligosaccharides are only a few of the components that help prevent and fight infections in the infant. Recent studies show the presence of microRNA, stem cells, cortisol and tens of other biologically active pathways. If such compounds and cells are present in breast milk, they must play a role that was shaped during evolution—even though we may not yet know how these operate.

Breast milk certainly has epigenetic effects, although again we are yet to understand what these operate, and what is their importance. The early initiation of breastfeeding, within one hour of birth, has important effects on survival that are independent of the duration of exclusive breastfeeding, and that may well be explained at least in part by its effects on gene activation and on the oral and gut microbiome. Regarding the latter, we are only starting to understand how the microbiome of breastfeed infants may affect their immune and neurological systems, the latter through pathways that include serotonin, cytokines and bacteria-produced metabolites.

Thus, we know many ways through which the mother can communicate with the infant through breastmilk, but do infants also communicate with mothers? They certainly do so, at least regarding how strongly they suckle and how
much milk they drink, as milk production is largely determined by feeding intensity. More recently, it has been proposed that at infant saliva –containing microRNA among other substances– may be sucked back into the nipple through a vacuum effect created by the mouth, thus providing a feedback loop to the mother. While this is still speculative, I would not be at all surprised if this is yet another way through which the child communicates back to its mother during breastfeeding.

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http://dx.doi.org/10.5546/aap.2017.eng.413

REFERENCES